

Aurorae Borealis Studia Classica

Vol. XIII

Articles on the aurora borealis in the

Acta Literaria Sveciæ

(1720–1729)

by Erik Johan Burman, Conrad Quensel
and Anders Celsius

digitized, with a biographical introduction and summary
of contents by Per Pippin Aspaas

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The thirteenth volume in the series presents all articles on the aurora borealis that were published in the journal of the Swedish Societas Literaria / Societas Regia Literaria et Scientiarum (now Kungl. Vetenskaps-Societeten i Uppsala) from 1720 to 1729. The articles are by the adjunct/professor of astronomy in Uppsala, Erik Johan (Ericus Johannes) Burman; the professor of mathematics in Lund, Conrad (Conradus) Quensel; and the adjunct/professor of astronomy in Uppsala Anders (Andreas) Celsius. E. J. Burman developed a theory of two kinds of aurora borealis and inspired other investigators across Sweden to observe the phenomenon according to his instructions. The introduction to the current volume of Aurorae Borealis Studia Classica is by Latinist and historian of science Per Pippin Aspaas. The introduction consists of a short history of the society in the period including brief presentations of Burman, Quensel and Celsius. Furthermore, Aspaas summarizes the contents of all articles dealing with the aurora and presents extracts in English translation.

In March 2023, the image-only scans of the originals were enriched to enable full-text search. I thank Dr. Stefan Zathammer of the ERC-funded NOSCEMUS project for his assistance in using the Transkribus software for the OCR (optical character recognition) process.

- The editor

Items digitized for this volume:

** All articles on the aurora borealis in the *Acta Literaria Sveciæ*, Volumen Primum (1720-1724, see [e-book](#)) and Volumen Secundum (1725-1729, see [e-book](#)), digitized by the Ministerio de Educación, Cultura y Deporte. Subdirección General de Coordinación Bibliotecaria.

The original copies of the *Acta Literaria Sveciæ*, with all quarterly issues from Volumen Primum and Volumen Secundum bound in a slightly chaotic order (e.g., parts of volume two are included at the end of volume one, and frontpages are not always placed where they should), can be found digitized as image-only scans at the Spanish [Biblioteca Virtual de Defensa](#).

THE SWEDISH *SOCIETAS LITERARIA* AND THE FIRST DECADE OF ITS *ACTA* (1720–1729)

Introduction
by Per Pippin Aspaas

A *Societas Literaria*, or Society of Learning, was founded in Uppsala in November 1719. The initiative came from the theologian and university librarian Erik (Ericus) Benzelius the Younger (1675–1743), who even ten years earlier had assembled a small circle of learned men in Uppsala, the short-lived, multidisciplinary *Collegium Curiosorum*. The equally multidisciplinary *Societas Literaria*, or “Bokwettsgillet” as it was sometimes called, proved to be a more robust initiative. By royal decree, the society obtained the official name *Societas Regia Literaria et Scientiarum* (Royal Society of Learning and Sciences) and a formal set of statutes in 1728; it persists to this day under the name Kungl. Vetenskaps-Societeten i Uppsala.

A first priority for the newly formed society was the publication of a journal. The *Acta Literaria Sveciæ* (Learned Proceedings of Sweden, hereafter *Acta*) were made in emulation of foreign models such as the *Acta Eruditorum* of Leipzig, the *Journal des Sçavans* of the Académie des Sciences in Paris and the *Philosophical Transactions* of the Royal Society of London. The Swedish journal had an empirical and regional focus, the scope being to discuss new observations and discoveries in natural history, medicine, agriculture as well as old manuscripts, historical remains and so forth. Ample space was given to book reviews and “Nova Litteraria” (learned news) from various places across Sweden. In keeping with this focus, and with inspiration from foreign societies and academies, articles on meteorology and other themes from the field of geophysics were included in the *Acta*.

The founding fathers of the society represented the natural sciences as well as the humanities. They were all based at the university of Uppsala but with correspondents and benefactors from other parts of the country as well. The Uppsala adjunct Erik Johan (Ericus Johannes) Burman (1692–1729), who from 1724 served as professor of astronomy, was one of the founders of the society and an important contributor to its *Acta*, especially as far as the aurora borealis is concerned. Burman is primarily remembered for his introduction of early-modern meteorology

to Sweden; it was in this context that he also called attention to the aurora. Another contributor was Conrad(us) Quensel (1676–1732), who served as a professor of mathematics at Lund University since 1712 and published meteorological reports in the *Acta*.

The *Acta* were published in quarterly issues, each comprising about 30 pages. They were printed in Uppsala by various printers and publishers, the place of publication sometimes stated as *Upsaliæ*, sometimes *Stockholmiaë & Upsaliæ*. Because the first issues quickly ran out of print, reprints were also made in Rostock and Leipzig. All issues from the first ten years were arranged in two volumes, with the *Volumen Primum* covering the years 1720–1724 and the *Volumen Secundum* covering the years 1725–1729. The first volume totalled 608 pages plus indices and illustrations without pagination, the second 614 pages plus indices and illustrations.

Central to the process of editing the *Acta* were the above-mentioned Benzelius and Burman. The former left Uppsala early in 1727 for the post as bishop in Gothenburg, whereas the latter passed away late in the year 1729. Thereafter, the driving force of the society was Burman's pupil, the professor of astronomy Anders (Andreas) Celsius (1701–1744), famous for the temperature scale that still bears his name. Celsius had been appointed secretary of the society already in 1725. In this capacity, he edited the *Acta* during the last period covered in this issue of *Aurorae Borealis Studia Classica*.

Included in this issue are articles that specifically mention the aurora borealis, often referred to by the synonyms *lumen septentrionale*, *lumen (nocturnum) boreale*, *aurora septentrionalis* or even the Cartesian term *chasma* (in plural, *chasmata*). As context for the reader, the first pages of relevant issues have also been included in chronological order.

Further reading

Ellegren, Hans: *Hvad nytt och nyttigt: Tillkomsten av landets första lärda sällskap: Kungl. Vetenskaps-Societeten i Uppsala*. Uppsala 2019 (also available online: <http://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Auu%3Adiva-383651>)



Frontispice from the first volume of the *Acta Litteraria Sveciae*

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*ACTA LITERARIA SVECIÆ, 1720–1729*Summary of contents pertaining to the aurora borealis
by Per Pippin Aspaas**VOLUMEN PRIMUM** Continens *Annos* 1720. 1721. 1722. 1723. & 1724.

The first three years of the *Acta* contain no mention of the aurora borealis. This circumstance is puzzling, in view of the surge of interest in the aurora internationally after a major auroral outbreak had been seen across Europe and the British Isles on 6 / 17 March 1716.¹ Nor is there any lack of regional or ‘national’ themes in the *Acta*. Nevertheless, the intriguing aurora is absent, even in an article such as the programmatic “INDEX EXPERIMENTORUM, quæ in montibus vallibusque LAPONIÆ ut instituerentur digna judicavit CHRISTOPH. POLHEM, Reg. Coll. Commerc. Consiliarius” (List of experiments that Christopher Polhem, Counsellor at the Royal Collegium of Commerce, deemed worthy of being conducted on the hills and in the valleys of Lapland), published in Anni MDCCXXII, Trimestre Secundum, pp. 285–289. In Polhem’s list of “experiments”, the use of barometers to measure the height of the far-northern atmosphere is included, but not the northern lights.

The first mention of the aurora borealis occurs in the article “Specimen Observationum Meteorologicarum Upsalensium A. 1722.” (Report on Meteorological Observations in Uppsala in the Year 1722) by E. J. B [i.e., Erik Johan Burman], in Anni MDCCXXIII, Trimestre Primum, pp. 387–393. The report begins with a reflection on the importance of meteorological observations for the general understanding of nature, followed by an explanation of the contents in the various columns of a table that is printed on p. 391. After the table there follows some specific remarks, including this short paragraph (p. 393):²

In total, we caught sight of the *aurora borealis*, which some call *lumen boreale* or *lumen horizontale*, more than thirty times within the last five months of the year. There was, however, no more than a single aurora that was particularly noteworthy: on 30 October, it covered the entire hemisphere of the sky, from beyond the pole and zenith and all the way to the axis of the south.

¹ Sweden used the Julian calendar until 1753, when the Gregorian calendar was introduced. For a complete list of observations published in the *Acta* in this period, see the dataset compiled by Per Pippin Aspaas: “Swedish observations of the Aurora Borealis in the period 1716-1732 in contemporaneous scholarly publications”, DataverseNO, 2023, DataverseNO, 2023, <https://doi.org/10.18710/G5J4YS>.

² All translations in this volume of *Aurorae Borealis Studia Classica* are by Per Pippin Aspaas.

In the Anni MDCCXXIV, there are three articles mentioning the aurora. The first two are short reports, “**Observationes Meteorologicae Upsalenses Anni 1723. per E. J. B.**” (Meteorological Observations in Upsala from the Year 1723 by E[rik] J[ohan] B[urman]), in Trimestre Primum, pp. 513–518 and “**C. Q. Observationum Meteorologicarum Lundensium A:i 1723. Epitome**” (Summary of C[onrad] Q[uensel]’s Meteorological Observations in Lund from the Year 1723), in Trimestre Secundum, pp. 543–544. The purpose is to provide short summaries of meteorological observations including – in Uppsala’s case – descriptions of the instruments used. Burman remarks that the aurora borealis was seen on several specific dates in 1723 “in the evening hours [...] and almost always in the north-western part of the sky” (p. 518). He does not, however, include these observations in the table on p. 515. Conrad Quensel’s brief table from Lund is clearly modelled after the Uppsala observations. The *lumen boreale* is mentioned on two dates in October 1723, a month that was otherwise marked by “a cloudy, thereafter rainy sky” (p. 544).

“**Observatio circa Lumen Boreale d. 20. Sept. Ao. 1717 prope Upsal. per E. J. Burman**” (Observation regarding a Lumen Boreale on 20 September in the Year 1717, near Uppsala, by E. J. Burman), in Anni MDCCXXIV, Trimestre Tertium, pp. 566–570 is an example of how single observations of particularly spectacular auroral outbreaks might inspire theoretical reflection among eighteenth-century investigators. Burman says that he for many years has paid attention to the aurora, “a meteorological phenomenon (*Meteoron*) that is quite spectacular and also frequent in our regions and other regions close to the Pole” (p. 566). He adds that according to elderly people it had grown in frequency in recent years. The properties of the aurora observed on 20 September 1717 are then presented before Burman reflects on the possible causes of the phenomenon. Referring to the essay on “*Les Météores*” in the *Discours de la Méthode* by Descartes, Burman admits that he is not fully satisfied with a purely optical explanation, nor is he entirely in line with those that claim that the aurora is caused by sulphureous particles ignited in the lower part of the atmosphere (p. 568, with Burman’s Latin terms in parenthesis):

For we have on many other occasions – especially in the case of the aurora borealis (*chasma*) of 17 March 1716, which was visible throughout the entire night and was far more spectacular here than in England, France, Germany and other places – observed aurorae with many more colours and not without the kind of sizzling and humming sounds that tend to be produced by a fireplace. Maybe we should, in fact, conclude that there are two kinds (*genera*) of the aurora borealis (*lumen boreale*) – an igneous meteorological phenomenon (*meteoron igneum*) arising from effluvia and exhalations on the one hand, and on the other a purely illusory kind (*mere parastaticum*) caused by various forms of refractions and reflexions of the solar rays, whether these refractions and reflexions come from floes or crystals of ice floating in the upper atmosphere or from the seas of the far north, brought to us via clouds.

Burman explains the kind of aurora arising from optical illusions by pointing to an experiment in which a plate of tin is cut into stripes by means of a sharp knife. Holding these stripes of tin

in one's hand and gently turning or shaking them, with a candle on one side and a darkened wall on the other, will produce "illusions quite similar to the ones described above" (ibid.). Burman stresses that his conclusions are only tentative. In order to arrive at a more secure understanding of the phenomenon, he advocates simultaneous observations at numerous locations and urges his readers to either publish or at least share with himself their observations (pp. 569–570).

VOLUMEN SECUNDUM Continens *Annos 1725. 1726. 1727. 1728. & 1729.*

In Anno MDCCXXV, Trimestre Primum, on pp. 11–13, there is another set of meteorological observations from Uppsala, "**Observationes Meteorologicæ Upsalenses Anni 1724. per E. Burman.**" The "lumen boreale" is mentioned on some specific dates in the table on p. 13.

The next report by Burman, in the Anno MDCCXXVI, has several mentions of "Aurora borealis" or "Aur. bor.": "**Synopsis Observationum Meteorologicarum Upsalensium Anni 1725. per E. J. Burman**", Trimestre Primum, pp. 139–141 (see the table on p. 141). The Trimestre Tertium from the same year presents the usual "**Epitome observationum meteorologicarum Lundensium Anni 1724. Per Conradum Qvensel**", on pp. 189–190, but this time without any mention of the aurora.

Similarly, the Anno MDCCXXVII has two articles of relevance to the aurora borealis: "**Synopsis Observationum Meteorologicarum Upsalensium Anni 1726. per Er. Burman**", in Trimestre Primum, pp. 254–257 and "**Tabella Meteorolog. Lund. Añ. 1725**" by C[onrad] Q[uensel], in Trimestre Secundum, p. 291. Whereas Quensel merely mentions two specific occurrences of "Aurora bor." in his table, Burman includes the following three paragraphs (p. 256):

How many times we saw the *aurora septentrionalis* the table [on p. 257] indicates. We have described the one observed on the 16th of March and intend to share our description with the public on another occasion. We will then also share the observations of this phenomenon that a friend of ours has been making for a while now upon our request, in *Torneå* [Tornio, Haparanda] in the very northernmost corner of the Bay of Bothnia.

A particularly noteworthy *lumen* [i.e., aurora] was seen in the evening of 8 October, Julian style, not only in Sweden, but also – albeit in a quite different form – in Germany, Poland, Switzerland, France and Britain (as we have been informed by public reports). As for us here, however, we could see nothing but a sky completely covered (or rather distinguished) by thick clouds tinged with a pinkish, rather dark colour, similar to the colour commonly exhibited by the moon during a total eclipse. The clouds were moving back and forth in various ways as if driven by the wind. This sight was especially vivid in the south-eastern part of the sky and lasted until 9 o'clock. Soon thereafter the sky turned altogether cloudy.

For the observations that were made of the same *lumen*, as well as another utterly spectacular one occurring on the 24th of the same month in Lund in Scania [Skåne], see the

dissertation *de Lumine Nocturno Boreali*, Sveth. *Nordskjen*, published there 26 November 1726, in quarto, pp. 16ff.

The use of first-person plural in Burman's account is not a rhetorical device. It appears that, ever since 1722 many of the meteorological observations in Uppsala had in fact been made by Anders Celsius, either together with Burman or on his own. Furthermore, in answer to a call from the Royal Society of London, Burman was by now coordinating meteorological observations from Sweden and reported these to his British peers (cf. p. 254 and the articles by Burman in following issues of the *Acta*, summarized below). Along with meteorological recordings, careful attention was paid to the aurora borealis by several observers around Sweden, perhaps inspired by the call for concerted efforts voiced by Burman in *Volumen Primum, Anni MDCCXXIV, Trimestre Tertium*, pp. 566–570. Thanks to Burman, a rather marked sense of community had developed among Swedish investigators of meteorology, including the 'meteoron' aurora borealis.³

Anno MDCCXXVIII has one article mentioning the aurora: "**Synopsis Observationum Meteorologicarum Upsalensium Anni 1727. per Er. Burman**", in *Trimestre Quartum*, pp. 490–493. Burman here refers to the call from the Royal Society of London and is happy to announce that he has received weather reports from a handful of observers at different places in Sweden. As for the aurora, Burman reports (p. 492):

The *aurora borealis*, or notorious *lumen septentrionale* was noted in its arc-like and more tranquil form at one place or another by our collaborating observers (while the rest of the locations usually experienced snowy, rainy or cloudy weather), on the following dates, always in the evening: January 2, 4, 6 in Lund; March 6 in Lund and 1, 8 and 17 in Bygdeå; April 7 at the same place; August 13, 20 and 27 at the same place; September 3, 7, 12, 19, 21, 24 and 29 at the same place; October 8 in Lund and 23 in Bygdeå; November 25 in Bygdeå and December 5 in Lund.

The same phenomenon in its more spectacular form, that is the more noteworthy *chasmata* consisting of flames or at least complex movement of rays or bands of varying colour as well as flashes, were seen on March 3 in Lund and Uppsala; July 26 in Bygdeå; October 3 in Uppsala and Bygdeå; October 4 in Lund and Bettna; October 9 in Lund and Uppsala; November 30 in Lund and December 6 in Lund and Bygdeå. We have no doubt that in case the sky had been clear at all times, these *chasmata* would have revealed themselves simultaneously at more locations distant from each other, if observers had been present; and given that each and every observer had recorded this phenomenon in their diaries. We sincerely wish, and indeed have reason to hope, that this will in fact take place in the future.

³ The observation of the aurora on 16 March 1726, mentioned in the above quotation, never appeared in the *Acta* but was published by Celsius in his 1733 monograph CCCXVI. *Observationes de lumine Boreali ab A. MDCCXVI. ad A. MDCCXXXII. partim a se, partim ab aliis, in Suecia habitas* (316 Observations of the Aurora Borealis made in Sweden from the Year 1716 to the Year 1732, partly by Himself, partly by Others), see *Aurorae Borealis Studia Classica* [vol. XV](#). The observations by "a friend of ours in Torneå" – namely, Abraham Fougt – were also included in the same book by Celsius. As for the 1726 dissertation (by Conrad Quensel) titled *de Lumine Nocturno Boreali*, see *Aurorae Borealis Studia Classica* [vol. XIV](#).

Anno MDCCXXIX has two articles where the aurora is mentioned: “**Synopsis Observationum Meteorologicarum Upsalensium Anni 1728. per Ericum Burman**”, in Trimestre Primum, pp. 513–515 and “**AND. CELSII Observationes Meteorologicæ, Upsaliæ habitæ An. 1729.**” (Anders Celsius’ Meteorological Observations, made in Uppsala in the Year 1729), Trimestre Quartum, pp. 610–611. Burman proudly announces that the number of meteorological observers has grown and points to the collaboration with the Royal Society of London. Some aurorae are mentioned in the table on p. 515 but no theoretical deliberations are included in the short report. Celsius follows the format of his late mentor scrupulously in his short report and includes some auroral observations in the table on p. 611, without further description.

The first ten years of the *Acta Literaria Sveciæ* thus included only one major article on the aurora, in which Erik Johan Burman presented a tentative theory of the lively, vivid, multi-coloured *Chasma* caused by effluvia and exhalations of sulphureous particles on the one hand, as opposed to the less spectacular, arc-like *Lumen septentrionale* caused by refraction or reflection of sunlight in the far north on the other.⁴ Burman introduced this classification to his network of meteorological observers and used the two categories again in 1728, when summarizing auroral observations made in the preceding year at multiple locations in Sweden.

⁴ See the 1724 article “*Observatio circa Lumen Boreale d. 20. Sept. Ao. 1717 prope Upsal*”, in which Burman presents his theory of two kinds of aurorae and where he also urges other observers to pay close attention to the phenomenon. This coincides with a remark in the protocol of the society on 18 September 1724: “It was discussed that one should set up certain fixed rules to be followed by interested persons when making observations of the northern lights” (In the original: “Discuterades, at man skulle uppsättja några wissa reglor för curieuse personer att i acht taga wid Nordskienens observationer”, quoted after Ellegren 2019, p. 120.) A comprehensive account of the auroral research made by Burman and his network of correspondents would require archival studies that fall outside the scope of this introduction.